No.



8500112

HHE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHAM COME;

Pioneer Hi-Bred International, Inc.

Willierens, there has been presented to the

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen years from the date of this grant, subject to the payment of the required fees and periodic replenishment of viable basic seed of the variety in a public repository as provided by LAW, the right to exclude others from selling the variety, or offering it for sale, or reproducing it, importing it, or exporting it, or using it in producing a hybrid or different very therefrom, to the extent provided by the Plant Variety Protection Act T. 1542, as amended, 7 u.s.c. 2321 et seq.)

WHEAT

'2551'

In Testimony Winercot, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D. C. this 31st day of March in the year of our Lord one thousand nine hundred and eighty-eight.

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Kenneth Herans Commissioner

Plant Variety Protection Office

Socretary of Agriculture

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2014 U.S. DEPARTMENT OF AGRICULTURE FORM APPROVED: OMB NO.0581-0055 AGRICULTURAL MARKETING SERVICE LIVESTOCK, MEAT, GRAIN & SEED DIVISION No certificate for plant variety protection may be issued unless a completed appli-APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE cation form has been received (5 U.S.C. (Instructions on reverse) 553). NAME OF APPLICANT(S) 3. VARIETY NAME 2. TEMPORARY DESIGNATION Pioneer Hi-Bred International, Inc. Plant Breeding Division Dept. of Cereal Seed Breeding 2551 W9021L FOR OFFICIAL USE ONLY 4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) 5. PHONE (Include area code) PVPO NUMBER (316) 662-5439 8500112 Hutchinson, Kansas 67501 6. GENUS AND SPECIES NAME DATE FAMILY NAME (Botanical) FILING 4/23/85 TIME Triticum aestivum gramineae 2:30 A.M. X P.M. AMOUNT FOR FILING 9. DATE OF DETERMINATION 1,800 RECEIVED June 15, 1980 4/23/85 AMOUNT FOR CERTIFICATE 10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) DATE Corporation 88 11. IF INCORPORATED, GIVE STATE OF INCORPORATION 12. DATE OF INCORPORATION May, 1926 13. NAME AND ADDRESS OF APPLICANT REPRESENATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Dr. Charles Hayward Pioneer Hi-Bred International, Inc. Hutchinson, Kansas 67501 14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED Exhibit A, Origin and Breeding History of the Variety (See Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.) Section 52 of the Plant Variety Protection Act.) d. X Exhibit D, Additional Description of the Variety Yes (If "Yes," answer items 16 and 17 below) No 17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? Registered Foundation Certified

Rt. #2

8. KIND NAME

Wheat

Iowa

Rt. #2

ь. X Exhibit B, Novelty Statement 15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? 18. DID THE APPLICANT(S) FILE FOR PROTECTION OF THE VARIETY IN THE U.S. OR OTHER COUNTRIES? Yes (If "Yes," give names of countries and dates)

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Yes (If "Yes," give names of countries and dates)

19. HAVE RIGHTS BEEN GRANTED IN THE U.S. OR OTHER COUNTRIES?

FORM LMGS-470 (9-81) (Edition of 1-78 is obsolete)

SIGNATURE OF APPLICANT	DATE
Charles F. Hayward	April 17, 19
SIGNATURE OF APPLICANT	DATE

13A. Exhibit A. Origin and Breeding History of 2551 Wheat

Pioneer variety 2551, <u>Triticum aestivum L.</u>, em Thell., a soft red winter wheat was developed by Pioneer Hi-Bred International, Inc. from the single cross Pioneer line W549/Pioneer line W558. Pioneer line W549 is a pure line selection from the cross CIMMYT line/Purdue 4946A4-18-2//Missouri W7718. The CIMMYT line was derived from the cross Tezanos Pintos Precoz, PI345731/2*Sonora 64, CI13930. Missouri W7718 was derived from the cross Missouri W6582/Redcoat, CI13170. The parentage of Missouri W6582 is Clarkan, CI8858//Vigo, CI12220/Norin 66. The exact parentage of Pioneer line W558 is not known. W558 was selected from the cross CIMMYT line/soft red winter line//soft red winter line. The exact identity of the three lines used in the cross is not known. The detailed parentage of Pioneer variety 2551 is:

Tezanos Pintos Precoz, PI345731/2*Sonora 64, CI13930// Purdue 4949A4-18-2/4/Clarkan, CI8858//Vigo, CI12220/ Norin 66/3/Redcoat, CI13170/5/Pioneer Line W558

In February of 1974, the single cross Pioneer line W549/Pioneer line W558 was made and 13 seeds were obtained. The Fl generation was grown in the greenhouse during early summer of 1974. F2 seed was space planted at Hutchinson, Kansas, in the fall of 1974. spring of 1975, 35 F2 plant selections were made based on plant height, maturity, straw strength, disease resistance, and head type. These selections were planted in mini-plots at Hutchinson in the fall of 1975. In the spring of 1976 individual head selections were taken from some of the 35 mini-plots and planted as F4 head rows in the Hutchinson nursery in the fall of 1976. In the summer of 1977, a single F4 head row was selected and harvested in bulk and entered into This F3 bulk was designated W9021. 1977-78 preliminary yield tests. W9021 was tested in preliminary yield tests again in 1979 and 1980. In 1980, 200 F7 head rows of W9021 were grown in the nursery at Windfall, Indiana, and 14 individual rows were selected. One of these rows was assigned the designation of W9021L. W9021L has been tested in yield trials and for milling and baking quality since 1981. 1983, one-tenth acre of W9021L, F10 generation, was grown and rogued

13A. Exhibit A cont.

for purity. The seed harvested from this one-tenth acre became breeder's seed. Following the 1984-85 harvest, W9021L will be designated to be sold as Pioneer variety 2551.

2551 has shown uniformity and stability for all traits as described in Exhibit C (Form LPGS-470-6) -- "Objective Description of Variety."

13B. Exhibit B. Novelty Statement

As one might expect from the pedigree, Pioneer variety 2551 is fairly distinctive from other soft red winter wheat varieties. is most similar to the Pioneer soft red winter wheat variety 2553. 2553 and 2551 are both awned and flower on the same day. there are a number of distinguishable differences between the two Plant height of 2551 averages 2 cm shorter than 2553 varieties. (Table 1). The plant color of 2551 at booting stage is green while 2553 is blue green. 2551 has a purple coleoptile while the coleoptile of 2553 is white. 2553 is more resistant to lodging than 2551 (Table 1). 2551 is more winterhardy than 2553 (Table 1). 2551 is more resistant to leaf rust, stem rust and powdery mildew than 2553 (Table 2553 is more resistant to soil borne and spindle streak mosaic viruses than 2551 (Table 1). 2551 averages 2 lbs/bu lower test weight than 2553 (Table 1). The one thousand kernel weight of 2551 averages six grams less than that of 2553.

(Whoat)

U.S. DEPARTMENT OF AGRICULTURE AGRICULTURAL MARKETING SERVICE LIVESTOCK, MEAT, GRAIN AND SEED DIVISION BELTSVILLE, MARYLAND 20785 OBJECTIVE DESCRIPTION OF VARIETY

	RITICUM SPP.)
NAME OF APPLICANTS	FOR OFFICIAL USE ONLY
Pioneer Hi-Bred International, Inc.	PVPO NUMBER
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) Plant Breeding Division	8599112
Plant Breeding Division Department of Cereal Seed Breeding	VARIETY NAME OR TEMPORARY DESIGNATION
Rt. #2	7
Hutchinson, Kansas 67501	2551
Place the appropriate number that describes the varietal character. Place a zero in first box (e.s. 0 8 9 or 0 9) when number	er of this variety in the boxes below. is either 99 or less or 9 or less.
I. KIND:	
1 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT	= POLISH 6 = POULARD 7 = CLUB
2. TYPE,	
2 1 = SPRING 2 = WINTER 3 = OTHER (Specify)	1 = SOFT 3 = OTHER (Specify) 2 = HARD
2 1 = WHITE 2 = RED 3 = OTHER (Specify)	
3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:	
2 2 9 FIRST FLOWERING	2 3 6 LAST FLOWERING
4. MATURITY (50% Flowering):	
NO. OF DAYS EARLIER THAN	1 = ARTHUR 2 = SCOUT 3 = CHRIS
0 2 NO. OF DAYS LATER THAN	1 4 = LEMHI 5 = NUGAINES 6 = LEEDS
5. PLANT HEIGHT (From soil level to top of head):	
0 9 5 cm. нібн	
CM. TALLER THAN	
0 5 CM. SHORTER THAN	1 = ARTHUR 2 = SCOUT 3 = CHRIS
PLANT COLOR AT BOOTING (See reverse):	4 = LEMHI 3 = NUGAINES
	7. ANTHER COLOR: 1
Z T = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN STEM:	1 I = YELLOW 2 = PURPLE
1 Anthocyanin: 1 = ABSENT 2 = PRESENT	2 Waxy bloom: 1 = ABSENT 2 = PRESENT
Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT	Internodes: 1 = HOLLOW 2 = SOLID
0 4 NO. OF NODES (Originating from node above ground)	2 1 CM. INTERNODE LENGTH BETWEEN FLAG LEAF
AURICLES:	
2 Anthocyanin: 1 = ABSENT 2 = PRESENT	2 Hairiness: 1 = ABSENT 2 = PRESENT
. LEAF:	
Flag leaf at 1 = ERECT 2 = RECURVED booting stage: 3 = OTHER (Specify):	1 Flag leaf: 1 = NOT TWISTED 2 = TWISTED
Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT	2 Waxy bloom of flag leaf sheath: I = ABSENT 2 = PRESENT
1 2 MM. LEAF WIDTH (First leaf below flag leaf)	2 1 CM. LEAF LENGTH (First leaf below flag leaf):

II. HEAD: (Mid-dense to lax)	The state of the s
1 Density: 1 = LAX 2 = DENSE	Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE
T Sensity. The Band	1 4 = OTHER (Specify)
	a vanni 1
4 Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED	J = AWNLETED
1 = WHITE 2 = YELLOW 3 = PINK 4	= RED
Color at maturity: 5 = BROWN 6 = BLACK 7 = OTH	ER (Specify):
0 8 CM. LENGTH	1 2 MM. WIDTH
12. CLUMES AT MAZHRITY	
12. GLUMES AT MATURITY: Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.)	7 - MEDULA (CA 2 5)
2 Length, 1 = Short (CA. 7 mm.)	3 = WIDE(CA. 4 mm.)
	and the second s
Shoulder 1 = WANTING 2 = OBLIQUE 3 = ROUNDED	3 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE
shape: 4 = SQUARE 5 = ELEVATED 6 = APICULATE	
13. COLEOPTILE COLOR:	14. SEEDLING ANTHOCYANIN:
3 1 = WHITE 2 = RED 3 = PURPLE	2 1 = ABSENT 2 = PRESENT
J TARRITE Z-RED VEFORFEE	
15. JUVENILE PLANT GROWTH HABIT:	
$2 \mid 1 = PROSTRATE$ $2 = SEMI-ERECT$ $3 = ERE$	ct:
16. SEED:	
1 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL	1 Cheek: 1 = ROUNDED 2 = ANGULAR
2 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG	1 Brush: 1 = NOT COLLARED 2 = COLLARED
Phenol reaction = IVORY 2 = FAWN 3 = LT. BROV	∀N
(See instructions): 4 = BROWN 5 = BLACK	
3 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE	5 = OTHER (Specify)
Color, To WHITE 22 AMBER 3- NED 4-1 ON CO	- Official (appears)
	3 4 GM. PER 1000 SEEDS
0 6 MM. LENGTH 0 3 MM. WIDTH	J 4 6 m. FER 1000 SEEDS
17. SEED CREASE:	
Width: 1 = 60% OR LESS OF KERNEL 'WINOKA'	Depth: = 20% OR LESS OF KERNEL 'SCOUT'
2 = 80% OR LESS OF KERNEL 'CHRIS'	2 = 35% OR LESS OF KERNEL 'CHRIS'
3 = NEARLY AS WIDE AS KERNEL 'LEMHI'	3 = 50% OR LESS OF KERNEL 'LEMHI'
18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)	
stem Rust Field LEAF RUST Field	
2 Races 2 LEAF RUST RACES 2 Races	O STRIPE RUST O LOOSE SMUT
1 POWDERY MILDEW O BUNT	OTHER (Specify)
19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)	
O SAWFLY O APHID (Bydv.)	O GREEN BUG O CEREAL LEAF BEETLE
0] 0, 11, 12, 13, 13, 14, 15, 15, 15, 15, 15, 15, 15, 15, 15, 15	
OTHER (Specify)) O GP T A T B T C
(LESSIAN TET	(O GP
RACES:	
	1 0 0 E 1 F 0 G
20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT	SUBMITTED:
CHARACTER NAME OF VARIETY	CHARACTER NAME OF VARIETY
	Seed size Pioneer Variety S76
Plant tillering Pioneer Variety 2553	Seed shape Pioneer Variety S76
Leaf size Pioneer Variety 2553	
Leaf color Caldwell Leaf carriage Tyler	Coleoptile elongation Pioneer Variety 2550
Leaf carriage Tyler	Seedling pigmentation Tyler

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

- (a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.
- (b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety-

13D. Exhibit D. Additional Description of the Variety

Pioneer variety 2551 is a common soft red winter wheat, <u>Triticum</u> aestivum L.

Flowering date of 2551 is two days later than the variety Arthur and one day earlier than Pioneer variety S76. At Windfall, Indiana, when seeded about October 1, average first flowering is May 27 or about 229 days after emergence. Last flowering averages about 7 days later. It is recognized that environmental factors influence flowering of varieties differently.

2551 has averaged 95 cm in height (Table 1), about 5 cm shorter than Arthur and 6 cm shorter than Pioneer variety S76.

The plant color of 2551 at booting stage is green, similar to Pioneer variety S76. Anther color of 2551 is yellow.

Anthocyanin has been absent in the stem of 2551. A very light waxy bloom occurs on the stem. Internodes of 2551 are hollow. At maturity, stems are yellow and strong. Normally four stem nodes are present above ground. Internode length between flag leaf and leaf below is about 21 cm. The last internode of the rachis is free of hairiness.

Auricles of 2551 exhibit anthocyanin and hairiness.

Flag leaves are generally erect at booting and not twisted. Hairs are absent from the first leaf sheath. A very light waxy bloom occurs on the flag leaf sheath. The first leaf below the flag leaf averages 12 mm wide and 21 cm long.

Spikes are generally mid-dense to lax, slightly tapering, awned, white to light yellow at maturity, and generally nodding at maturity. Awns are rough and about 4-6 cm in length. Spike width and length averages 12 mm and 8 cm, respectively. However, spike width and length are variable with plant population and level of production.

The glumes of 2551 are medium in length and wide, glabrous and generally the shoulders are oblique. Beaks are acuminate and average 2-3 mm in length.

Coleoptile color is purple and seedling anthocyanin is present. Juvenile plant growth habit is semi-erect.

13D. Exhibit D cont.

Kernels are red in color, ovate in shape, with rounded cheeks and a shallow crease. The brush is not collared and medium in size.

Kernels average 6 mm long and 3 mm wide and weigh 34 g per 1000.

Phenol reaction is black, similar to Vermillion.

2551 is resistant to leaf rust (<u>Puccinia recondita</u> f. sp. <u>tritici</u>) and stem rust (<u>P. graminis</u> f. sp. <u>tritici</u>) races currently common in the soft red winter wheat region. 2551 has not been tested for specific races of leaf rust, stem rust, stripe rust (<u>P. striiformis</u>), bunt (<u>Tilletia foetida</u> and <u>T. caries</u>) and loose smut (<u>Ustilago tritici</u>). While susceptible to powdery mildew (<u>Erysiphe graminis</u> f. sp. <u>tritici</u>), the progression of the disease up the plant is very slow (Table 1).

2551 has a good level of resistance to soil borne mosaic virus and spindle streak mosaic virus. While the level of resistance to these two viruses is lower than Pioneer variety S76, it is still better than the level exhibited by Purdue variety Caldwell (Table 1).

2551 is susceptible to races A, B, C, D, and F of Hessian fly and has not been tested for races GP, E and G. Hessian fly tests were conducted by the Small Grain Insect Pests Resistance Group, USDA-ARS, Department of Entomology, Purdue University, Lafayette, Indiana. 2551 has not been tested for sawfly, BYDV, green bug, and cereal leaf beetle.

2551 has an excellent yield record when compared with current soft red winter wheat varieties (Table 1). Short plant height and good straw strength give 2551 excellent resistance to lodging.

2551's level of winterhardiness is similar to Pioneer variety 2550 and Purdue variety Caldwell (Table 1).

The milling and baking qualities of 2551 are generally equivalent to current varieties grown in the SRW region (Table 2).

Performance of Pioneer Varieties 2551, 2550, 2553 and S76 and Purdue Variety Caldwell in Yield Trials (1983 and 1984).* Table 1.

Purdue Variety Caldwell	77.I	58.4 98.4	. 50 . 50 . 60	9	6.0					3.2	9.0
376	67.4	58.5	56.7	7.5		. 4 . 4.	8.7	8.7	3.0	5.4	7.8
Variety 2553	73.4	59.2 97	55.5		0 F	7.0	8.7	•	2.6	4.6	•
Pioneer Variety 2550 2553	75.6	58.1 96		e*9	7 5.3	7.9	7.7		2.5	3.8	6.3
2551	78.6	57.2 95	55.4	•	 		9.9	7.4	7.0	4.6	6. 8
Loc/Yrs	26	23	7	ω (o m	7	ന	7 (n	-	ო
Reps	106	88 82 82	25	21	13 11	æ	15	4, 2	1 .	ī.	12
<u>Trait</u>	Yield (Bu/A) Test Weight	(lbs/Bu) Height (cm) Days to 50%	Flowering After 4/1	Lodging Score**	Leaf Rust**	Stem Rust**	SSMV **	DOM: V	FOWCELY MILGEW Rhizoctonia	solani**	Winterhardiness**

*Yield trials were grown in eastern Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan **Scale 1-9 where 9=excellent or resistant and 1=poor or 100% susceptible ***Soil Borne Mosaic Virus data collected at University of Illinois SBMV Nursery

(Pioneer Wheat Quality Lab). Results of Quality Testing on 2551 Table 2.

PSI (%)	29.5 31.8	29.5 32.1
Cookies Diam.(cm)	18.7	18 18.5
AWRC (%)	ons) 55.8 55.2	55.7 54.8
Flour Protein(%)	test/locati 9.2 8.8	ns) 9.1 9.8
Break Flour(%)	84 Crops (10 34.9 35.8	test/locations 33.9 34.7
Flour Yield(%)	Checks, 1981-84 Crops (10 test/locations) 68.4 34.9 9.2 55 68.8 35.8 8.8	-83 Crops (7 68.5 69.5
Sample	Vs. Avg. All 2551 Avg. Check	vs. Abe, 1981- 2551 Abe

PSI (vs. Avg. All Checks) does not include 1984 data. Notes:

Check samples include various combinations of: Abe, Beau, Caldwell, M1003, Sullivan, Titan, Tyler, and Pioneer brands S76, 2550 and 2553

Locations tested include: Loogootee and St. Joe, Illinois; Ft. Branch and Tipton, Indiana; Perry and Blissfield, Michigan.

14E. Exhibit E, Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Plant Breeding Division, believes it is the sole, original and first breeder of the 2551 variety of soft red winter wheat for which it solicits a certification of protection.